REMARKS

Status

Claims 17-36 are pending in the application. Claims 17, 23, 30, and 35 have been amended. Claims 36 is new. Reconsideration is respectfully requested.

Claim Objections

The Office Action objects to claims 17, 23, and 30 based on a typographical error. Claims 17, 23, and 30 have been amended to address the concerns addressed by the Office Action.

Rejection Under 35 U.S.C. §112

Claim 35 is rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. The Office Action asserts that the specification lacks written description because there is no explanation that the printer does not include image processing. *See* Office Action, p. 2. Applicants respectfully disagree. In Figure 1, which is labeled prior art, the PC includes an image processing block and the printer includes an image processing block. In Figure 3, which is not labeled prior art, the PC includes an image processing block, but the printer does not include an image processing block. Figure 3, viewed in light of the entire disclosure, would reasonably convey to one skill in the relevant art that the host device includes image processing and the printing device does not include image processing.

Claim 35 is rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particular point out and distinctly claim. The Office Action requests clarification whether the term "image processing" should include the compression algorithm. *See* Office Action, p. 2. Claim 35 has been amended to clarify that the printing device decompresses the interim data, but also does not include image processing.

Rejection Under 35 U.S.C. §103

Claims 17-23, 26-29, and 31 were rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 7,103,833 ("Sano") in view of U.S. Patent No. 6,369,911 ("Hattori"), and further in view of U.S. Patent Application Publication No. 2002/0067509 ("Roylance"). Claims 30 and 35 were rejected under 35 U.S.C. §103(a) as being obvious over Sano in view of Roylance. Claims 32-34 were rejected under 35 U.S.C. §103(a) as being obvious over Sano, Roylance, Hattori and further in view of U.S. Patent No. 5,915,079 ("Vondran").

Sano describes a host computer 1 and an output apparatus 2 including an output device (printing mechanism). *See* col. 4, lines 6-11, 28-32. The host computer 1 includes an application 100 and a print driver 130, which converts data to page description language (PDL) data. *See* col. 4, lines 53-55. The output apparatus 2 includes a decomposer 140 and calls a processing module, which may be a graphics processor or a text processor. *See* col. 4, lines 56-67.

Hattori is cited for various aspects of a printing device but not for the host machine. *See* Office Action, p. 4. For example, FIG. 1 illustrates that the processor 300 of Hattori is located in the laser printer 200 and not in the host computer 100.

Roylance describes a resolution enhancement procedure in a laser printer. Roylance is completely silent regarding image processing in a host machine.

The Office Action asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Sano, Hattori, and Roylance to arrive at the claimed invention. Applicants submit that the references, even in combination, fail to teach or suggest all of claim limitations, for the reasons addressed below. In addition, Applicants submit that the combination of Sano, Hattori, and Roylance is improper in light of secondary considerations.

In effect, the Office Action contends that the prior art teaches the functions as claimed, that the prior art teaches a host device and a printer, and that any division of the functions between the host device and the printer would have been obvious. Applicants respectfully disagree. The invention as claimed recites a specific combination in which the host device performs certain functions and the printer performs other functions. The specific division of the functions between the host device and the printer is not taught or even suggested in the art. And, the specific division of functions is not obvious based on the teachings in the art. In support of this contention, Applicants enclose a declaration of the inventors.

The declaration provides background as to the previous solutions of printer-based processing and of host based processing. As supported by the enclosed declaration, the previous printers with printer-based processing operated such that the printer would render the entire page. This required that the printer essentially include a full computer system, which is costly. See declaration, ¶4. To reduce cost, host-based processing emerged in which the host rendered the entire page. In host-based processing, a 1 bit per pixel output is sent to the printer. However, problems of quality emerged in host-based processing. In particular, the laser printing system could not produce high quality images using 1 bit per pixel data. See declaration, ¶5. These solutions were known in the art since approximately 1998 so that a long-felt need was recognized and persistent, See declaration, ¶6.

The solution involves a unique and non-obvious division of the functions between the host machine and the printer. In particular, the solution involves combining, by the host machine, the printer ready data with print engine control commands, as recited in claims 17, 23, and 30. The claimed invention is an improvement in quality because the interim data has a higher bit rate than in host-based processing and the print engine control commands allow the print engine to generate pulse codes that could not be generated from one bit per pixel data. See declaration, ¶7. The claimed invention can be implemented at lower cost that printer-based processing. See declaration, ¶8.

The long-felt need had not been adequately addressed by others. See declaration, ¶9. In light of the recognized long-felt need without a solution before the invention by Applicants, the combination of Sano, Hattori, and Roylance would not have been obvious to one of ordinary skill in the art at the time the invention was made.

Claim 17

Claim 17 recites a printing method including:

> generating page data having a first bit rate per plane per pixel from a first application running on a host machine;
> examining the page data in groups of at least two adjacent pixels by use of a second application running on the host machine;
> rendering, by the host machine, printer ready data based on the examination of the page data;
> combining, by the host machine, the printer ready data with print engine control commands operable to control a print engine to create interim data having a second bit rate per plane per pixel, the second bit rate being lower that the first bit rate;
> transferring the interim data to a printing device;
> generating, within the printing device, pulse codes from the interim data; and
> rendering a hardcopy image from the pulse codes.

A. None of the cited references teach or suggest examining the page data in groups of at least two adjacent pixels by use of a second application running on the host machine.

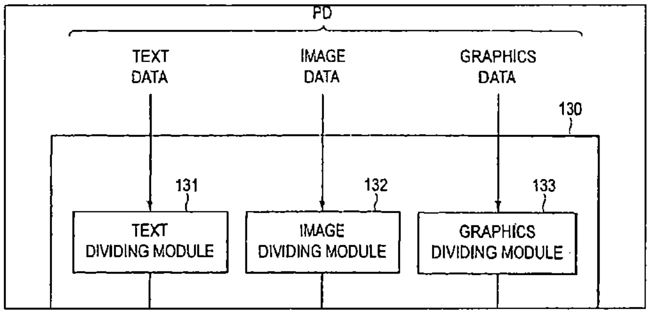
The Office Action asserts that the printer driver of Sano corresponds to the second software application on a host machine. Further, the Office Action asserts that the resolution converting process described by Sano examines the page data in groups of at least two adjacent pixels. *See* Office Action, p. 8 (*citing* Sano col. 9, lines 3-9). Sano refers to a "resolution converting process performed in accordance with image data of adjacent pixels." *See* col. 9, lines 7-9. However, Sano's disclosure is taken out of context.

Sano states "the decomposer 140 of the output apparatus 2 converts the resolution by performing interpolation and/or thinning." *See* col. 9, lines 3-7. Figure 2 clearly shows that the decomposer 140 is part of the output apparatus 2. Therefore, the resolution converting process, relied on by the Office Action as the second software application running on the host machine, is actually performed in the output apparatus 2, which is the printing mechanism.

Neither Hattori nor Roylance fills in the gaps left by Sano. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest examining the page data in groups of at least two adjacent pixels by use of a second application running on the host machine.

The Office Action states the argument that "none of the cited references teach or suggest examining the page data in groups of at least two adjacent pixels by use of a second application running on the host machine" is not persuasive because the "the second software application is considered as the printer driver, the resolution converting process 132, of figure 6 i.e. in the printer driver is performed in accordance with image data of the adjacent pixels." *See* Office Action, p. 4.

Applicants respectfully submit that the Office Action has mischaracterized the reference. As shown in a portion of Figure 6, reproduced below, reference numeral 132 refers to an image dividing module, and not the resolution converting process as stated by the Office Action. Sano does discuss a resolution converting process, but only as part of the decomposer 140 of the output apparatus 2. *See* col. 9, lines 3-7. Therefore, Sano does not teach or suggest examining the page data in groups of at least two adjacent pixels by use of a second application running on the host machine.



B. None of the cited references teach or suggest combining, by the host machine, the printer ready data with print engine control commands operable to control a print engine.

The Office Action acknowledges that Sano does not describe combining, by the host machine, the printer ready data with print engine control commands operable to control a print engine. *See* Office Action, p. 9. However, the Office Action turns to Roylance for these features.

Roylance describes a resolution enhancement procedure in laser printer. Roylance describes halftone image enhancement performed by circuitry 206. *See* [0042]. However, all of the enhancement procedures in Roylance are performed in a laser printer. *See* [0028]-[0030].

Therefore, Roylance does not teach or suggest combining, by the host machine, the printer ready data with print engine control commands operable to control a print engine.

Hattori does not fill in the gaps left by Sano and Roylance. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest combining, by the host machine, the printer ready data with print engine control commands operable to control a print engine.

C. None of the cited references teach or suggest interim data having a second bit rate per plane per pixel, the second bit rate being lower that the first bit rate.

The Office Action asserts that Sano teaches interim data having a second bit rate per plane per pixel lower that the first bit rate of the page data. *See* Office Action, p. 6, 8.

As preliminary manner, it is not clear how the Office Action can acknowledge that Sano lacks a teaching of printer ready data combined with print engine commands but also state that Sano teaches the interim data because the interim data is created from the combination of the printer ready data and print engine commands.

In addition, Sano fails to describe a second bit rate per plane per pixel of the interim data. In fact, Sano is completely silent regarding any bit rates.

Neither Hattori nor Roylance fill in the gaps left by Sano. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest interim data having a second bit rate per plane per pixel, the second bit rate being lower that the first bit rate.

D. None of the cited references teach or suggest transferring the interim data to a printing device.

The Office Action asserts that Sano teaches transferring the interim data because PDL data is converted into raster data by the decomposer 140. *See* Office Action, p. 9. However, as discussed above, decomposer 140 is shown by Figure 2 as part of the output apparatus 2, which is the printing mechanism. The output apparatus cannot transfer the interim data to itself. Therefore, Sano fails to teach or suggest transferring the interim data to a printing device.

Neither Hattori nor Roylance fill in the gaps left by Sano. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest transferring the interim data to a printing device.

For at least these reasons, Applicants request that the rejection of claim 17 be withdrawn. Further, the rejections of claims 18-22 should be withdrawn because, at a minimum claims 18-22 depend from claim 17.

Claim 23

Claim 23 is directed to a printing system including a host machine and a printing device, the printing system. Claim 23 recites:

> a first software application on the host machine configured to generate page data having a first bit rate per plane per pixel;
>
> a second software application on the host machine examining the page data in groups of at least two adjacent pixels;
>
> a print data processor in the host machine configured to render printer ready data based on the examination of the page data and configured to combine the printer ready data with print engine control commands operable to control a print engine to create interim data having a second bit rate per plane per pixel, the second bit rate being lower that the first bit rate;
>
> a first communication device in the host machine configured to transfer the interim data;
>
> a second communication device in the printing device configured to receive the interim data;

a pulse code generator in the printing device configured to receive the interim data and configured to generate a pulse code corresponding to the interim data; and

a print engine configured to receive the pulse code and transform the pulse code to a hardcopy image.

A. None of the cited references teach or suggest a second software application on the host machine examining the page data in groups of at least two adjacent pixels.

As discussed above, Sano refers to a resolution converting process performed in accordance with image data of adjacent pixels performed in the decomposer 140 of the output apparatus 2 (printing mechanism).

However, the decomposer in the output apparatus is not a second software application on the host machine. Therefore, Sano does not teach or suggest a second software application on the host machine examining the page data in groups of at least two adjacent pixels.

Neither Hattori nor Roylance fill in the gaps left by Sano. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest a second software application on the host machine examining the page data in groups of at least two adjacent pixels.

B. None of the cited references teach or suggest a print data processor in the host machine configured to render printer ready data based on the examination of the page data and configured to combine the printer ready data with print engine control commands.

As discussed above, the Office Action acknowledges that Sano does describe a print data processor in the host machine configured to combine the printer ready data with print engine control commands. *See* Office Action, p. 11. However, the Office Action turns to Roylance for these features.

Roylance describes a resolution enhancement procedure in laser printer. Roylance describes halftone image enhancement performed by circuitry 206. *See* [0042]. However, all of the enhancement procedures in Roylance are performed in a laser printer. *See* [0028]-[0030]..

Therefore, Roylance does not teach or suggest a print data processor in the host machine configured to combine the printer ready data with print engine control commands.

Hattori does not fill in the gaps left by Sano and Roylance. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest a print data processor in the host machine configured to combine the printer ready data with print engine control commands.

C. None of the cited references teach or suggest interim data having a second bit rate per plane per pixel, the second bit rate being lower that the first bit rate.

As discussed above, Applicants cannot find any reference in Sano related to a second bit rate per plane per pixel of the interim data. Sano is completely silent regarding any bit rates.

Neither Hattori nor Roylance fill in the gaps left by Sano. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest interim data having a second bit rate per plane per pixel, the second bit rate being lower that the first bit rate.

D. None of the cited references teach or suggest a first communication device in the host machine configured to transfer the interim data.

As discussed above, the Office Action interprets Sano to teach a first communication device in the host machine configured to transfer the interim data because PDL data is converted into raster data by the decomposer 140. *See* Office Action, p. 10. However, decomposer 140 is shown by Figure 2 as part of the output apparatus 2, which is the printing mechanism. Therefore, Sano fails to teach or suggest transferring the interim data to a printing device.

Neither Hattori nor Roylance fill in the gaps left by Sano. Therefore, none of Sano, Hattori, Roylance or combinations thereof teach or suggest a first communication device in the host machine configured to transfer the interim data.

For at least these reasons, Applicants request that the rejection of claim 23 be withdrawn. Further, the rejections of claims 24-29 should be withdrawn because, at a minimum claims 24-29 depend from claim 23.

Claim 30

Claim 30 recites combining, by the host machine utilizing the at least one processor, the printer ready data with print engine control commands operable to control a print engine to create interim data having a second bit rate per plane per pixel, the second bit rate being lower than that the first bit rate, compressing, using a compression algorithm, the interim data in the host machine utilizing the at least one processor; and transferring the compressed interim data to a printing device.

For at least the reasons discussed above, none of Sano, Roylance or combinations thereof teaches or suggest all of the features of claim 30. Therefore, Applicants respectfully request that the rejections of independent claims 30 and dependent claims 31-34 be withdrawn.

Claims 32-34

The Vondron reference was only relied upon for the rejection of dependent claims. Because the dependent claims are allowable at least because of their dependency from an allowable independent claim, a detailed discussion of the Vondran reference is omitted. However, Applicant submits that the Vondran reference does not address the deficiencies of Hattori, Sano, and Roylance, and, in addition, that the dependent claims are patentable in their own right.

Conclusion

In view of the remarks above, Applicants respectfully submit that all of the pending claims are in condition for allowance and seek an early allowance thereof. If the Examiner is unable to allow the application in the next Office Action and believes that an interview would be helpful to resolve any remaining issues, the Examiner is respectfully requested to contact the undersigned at (312) 840-3225.

Respectfully submitted,

Ryan Gleitz
Attorney for Applicants
Registration No. 62,164

BRINKS HOFER
GILSON & LIONE
P.O. Box 10395
Chicago, Illinois 60610
(312) 321-4200

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